

MAU11601 Assignment 3
Due 2026-10-15

1. Use `unfold` to create a function `pow2` such that `(pow2 m)` returns a list of all powers of two less than `m`. I'm not going to be picky about the order of the list.
2. You probably know what an airlock is, but just in case: there are two doors, an inner door and an outer door, separating three spaces, the inner space, the airlock itself, and the outer space. Normally both doors are closed. They should never both be open. To go outside you open the inner door, enter the airlock, close the inner door, open the outer door, and leave the airlock. Going inside is the reverse procedure.

Suppose you want to create an airlock simulator. It will respond to keystrokes `L` and `R` to move left or right, with the inner space on the left and outer space on the right, and keystrokes `I` and `O` to open/close the inner or outer door. We don't need separate keystrokes for opening and closing since we can't open an open door or close a closed door, so there's only ever one thing we could do to a door. The doors are remotely operated, so you don't have to be next to one to open or close it. The programme should ignore keystrokes that don't make sense, like moving through open doors, and ones which would kill everyone, like opening both doors.

We won't write the full programme but just take the first step, which is to identify the possible states and the state transitions corresponding to the various key strokes. Do that.